SUBSTITUTE SPECIFICATION

METHOD AND APPARATUS FOR PRINTING ON SUBSTRATES FOR PREPARING PACKAGING BLANKS

FIELD OF THE INVENTION

[0001] The invention relates to a method and apparatus for printing on a substrate for preparing packaging blanks. The substrate is divided into copies, each of these copies having one or more areas for application of an adhesive, and a printed image which is produced on the copy by application of an ink film and coated with a lacquer.

BACKGROUND OF THE INVENTION

[0002] For lacquering surfaces of substrates in the packaging industry, it is customary to use printing plates made for this purpose as lacquering plates. These lacquering plates are provided with partial recesses in order to keep adhesive flaps of packaging blanks free of lacquer. This procedure was introduced in the book entitled "Offsetdrucktechnik" (Offset Printing Technology) by Helmut Teschner, 9th Edition, 1995, pages 11 - 43. It is a disadvantage that special lacquer plates are required, which are expensive to manufacture.

SUMMARY OF THE INVENTION

[0003] It is an object of the present invention to develop a method and apparatus for printing on a substrate for preparing packaging blanks, for which specially manufactured lacquer plates are not required.

[0004] Pursuant to the present invention, this object is accomplished by the distinguishing features as claimed.

[0005] The present invention has the advantage that a single lacquer plate can be used for several printing applications. This lacquer plate is free of partial recesses. As a result, the manufacturing costs can be reduced greatly. Since the lacquer plate can be used for several printing applications, the changeover times can also be shortened. Moreover, only one lacquering unit or lacquer tower is required.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] The invention is described in greater details by means of examples with reference to the following drawings:

[0007] Figure 1 shows a diagrammatic representation of a sheet-fed offset printing press with three printing units; and

[0008] Figure 2 shows a diagrammatic representation of a sheet-fed offset printing press with five printing units.

DETAILED DESCRIPTION OF THE INVENTION

[0009] Example 1

[0010] As can be seen from Figure 1, this sheet-fed printing press comprises printing units 31, 32, 13, which are disposed in series. In Figure 1, three printing units 31, 32, 13 are shown as an example. The method of the present invention can also be carried out with only two printing units.

[0011] A feeding apparatus 1 precedes the printing units 31, 32, 13. The construction and function of the feeding unit 1 are known so that it is unnecessary to go into detail herein. Each of the printing units 31, 32, 13 comprises a back-pressure roll 21, 22, 25, a plate cylinder 5 and a rubber-covered cylinder 6. In Figure 1, the plate cylinder 5 and the rubber covered cylinder 6 are labeled only in the printing unit 31. The direction in which sheets move is indicated by an arrow. Furthermore, each of sheet-guiding cylinders 71, 72 is in contact with two of the back-pressure rolls 21, 22, 25 and may be constructed as a turning drum and used in face printing and perfecting printing. The back-pressure rolls 21, 22, 25 and the sheet-guiding cylinders 71, 72 are sheet-guiding cylinders with twice the diameter. Tinting units and damping units belonging to each printing unit 31, 32 are not shown in Figure 1. A dryer 111 may be assigned to the printing unit 31.

[0012] The printing units 31, 32 are intended for printing an ink system which contains printing inks with radiation-drying, usually UV-drying components. It is, however, also possible to use the printing units for printing other inks. These printing inks may be, for example, printing inks typical for offset printing.

[0013] The printing unit 13, which is intended for coating the surfaces of the copies intended for application of an adhesive, is disposed after the printing unit 32.

[0014] In the direction in which the sheets are moving, a lacquer tower 4 for coating the printed image with a layer of lacquer is disposed after the printing unit 13. This layer of lacquer can also be dried by radiation. The lacquer tower 4 comprises a back-pressure roll 26, to which a lacquer plate cylinder 8 is assigned. A lacquer plate 81 is clamped on the lacquer plate cylinder 8. A sheet-guiding cylinder 75 precedes the back-pressure roll.

[0015] An engraved ink transfer cylinder roll 9 is assigned to the lacquer plate cylinder 8 or the lacquer plate 81. A chamber doctor blade 10 is used for supplying

lacquer to the engraved ink transfer cylinder roll 9. Furthermore, a dryer 112 is assigned to the lacquer tower 4.

[0016] A delivery end 12 is provided after the lacquer tower 4. The construction and function of the delivery end 12 are known so that they are not described in detail herein.

[0017] The method of the present invention described below may be realized with the apparatus shown in Figure 1.

[0018] A sheet to be printed is fed to the feeding apparatus 1 and taken hold of by the apparatus, the details of which are not described herein, and put into motion in the direction of the arrow. In the printing units 31, 32, a first ink system is applied over the rubber-covered cylinder 6. The ink system is understood to be a combination of inks, which have essentially the same processing properties.

[0019] The ink system used in the printing units 31, 32 may contain an ink which cures under radiation, for example, under UV radiation. Such inks are referred to as hybrid inks. It is, however, also possible to use inks which are typically used for offset printing, or other inks, such as pure UV inks.

[0020] Optionally, the inks can be dried by the dryer 111.

[0021] In the printing unit 13, a second ink system is applied on the surfaces provided for application of an adhesive. This ink system contains only a small amount of pigments or substantially no pigments at all.

[0022] In the lacquer tower 4, the surface of the substrate is coated with a colorless lacquer. The lacquer used for this purpose has the property of interacting differently with the ink systems applied. This takes place due to the fact that the lacquer is

absorbed by the coating (the second ink system) of the surface intended for application of an adhesive. However, the lacquer remains largely on the other surface applied with inks of the first inking system, and endows the surface with a gloss.

[0023] It is a prerequisite for the occurrences of the above effect that the two inking systems differ from one another with regard to lacquer-absorption capability. The degree of gloss is inversely proportional to the capacity of the ink system to absorb lacquer, so that more lacquer remains on surfaces of ink layers with ink systems of lower absorptive capacities, and more lacquer is absorbed by ink layers with ink systems of higher absorptive capacities. The gloss-determining components of the lacquer can be taken up by the ink layers. Thus, the coating forms a suitable substrate for subsequent application of an adhesive.

[0024] Example 2

[0025] The construction of the sheet-fed printing press for realizing the method of example 2 corresponds largely to the configuration shown in Figure 1.

[0026] Instead of a second ink system, a binder customarily used in offset printing, usually a varnish, is printed by the printing unit 13.

[0027] When the lacquer is applied over the surface of the substrate in the lacquer tower 4, the effect resulted from absorption of the lacquer by the ink systems as described above also occurs here when a binder is used.

[0028] Example 3

[0029] As is evident from Figure 2, two printing units 31, 32 for printing a first ink system are disposed in this example. A dryer 111 may be assigned to the printing unit 32. Two additional printing units 33, 34 for printing an additional ink system and a

printing unit 13 are disposed after the printing units 31, 32. As in the preceding examples, the series of printing units also ends at a lacquer tower 4.

[0030] With this configuration, the following method is realized:

[0031] The printed image desired for a corresponding packaging is applied by the printing units 31, 32. In this connection, a layer of inks comprising inks of a first ink system is applied in the printing units 31, 32. This layer may be composed of hybrid inks, which is understood to be inks comprising at least some ink which can be cured by radiation (especially by UV radiation). These inks are dried in the printing unit 31 by a dryer 111, which is constructed as a UV radiator.

[0032] The printing units 33, 34 are used for printing an ink system, which comprises inks typically used for offset printing. These inks do not have to be dried by an appropriate device.

[0033] In the printing unit 13, a binder which is customarily used in offset printing, usually a varnish, is applied on the areas intended for application of an adhesive.

[0034] Subsequently, the surface of the substrate is coated in the lacquer tower 8 with a closed layer of lacquer. The lacquer is absorbed by the coating of the areas intended for application of an adhesive. The other areas of the copy are coated with different ink systems by the printing units 31, 32, 33, 34. Due to different lacquer absorptive capacities of the ink systems, the lacquer is absorbed by these areas in different amounts. As a result, different degrees of gloss can be achieved.